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Foot and Mouth Disease - Time of Day of Maximum Spread

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Previous memoranda (232, 233, 234 and 238) suggested a set of 'preferred tracks' which seemed to be the most likely to have provided opportunity for wind-borne spread of foot and mouth disease.

These tracks were chosen in relation to distance, source strength and incubation period, and although they cannot be claimed to be definitive, especially as many alternative tracks were available, these preferred tracks were analysed to see if there was any non-chance distribution in the implied time of occurrence of the effective winds.

All local spread of less than 1 km was ignored, leaving 232 tracks for the 4 epidemics. The results were: (Times GMT)

01h	8	05h	19	09h	6	13h	12	17h	4	21h	13
02h	9	06h	17	10h	7	14h	10	18h	8	22h	11
03h	12	07h	13	11h	2	15h	9	19h	20	23h	4
04h	12	08h	6	12h	6	16h	4	20h	13	24h	7

This shows a two-peak structure on a 24 hour time base, namely

05-07h = 49 occasions (average 3 hr total = 29)
19-21h = 46 occasions

which suggests an increased infection risk at dawn and dusk.

Dividing the results into 4 hour-blocks gives

01-04	05-08	09-12	13-16	17-20	21-24 hours GMT
41	55	21	35	45	35

or

00-03	04-07	08-11	12-15	16-19	20-23 hours GMT
36	61	21	37	36	41

when the average per block is 39.

Both these distributions are significantly different from a chance distribution ($P < 0.01$).

In both analyses the early morning peak is evident. The cause for this may be meteorological, i.e. increasing wind with inversion still present, or operational, i.e. feeding or milking time.

This analysis cannot be pressed further, as the "preferred tracks" have no other basis than an attempted reasoned selection, but the skew distribution of suspected times of spread could have a logical basis.

Any comments or suggestions on this paper should be sent to the author.

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Distribution of Suspected Times of Day When Infection Occurred